# The Stock Market and Short Selling: Mechanics, History, Regulation, Motivations and Effects

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# The Effect of the Public Release of Short Interest Information on the Market Prices of NASDAQ Technology Stocks

A Two-Part Honors Thesis (HONRS 499)

by

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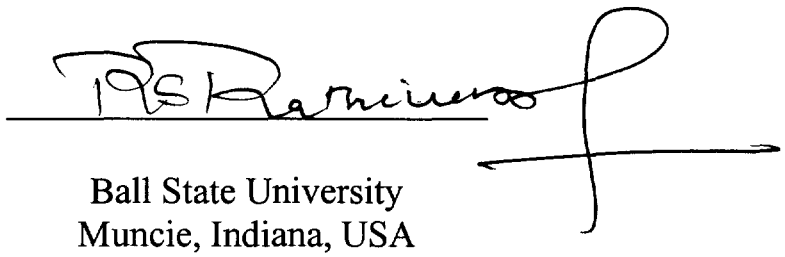

Ball State University
Muncie, Indiana, USA

December 2002

15 December 2002

Acknowledgements:

I would like to thank
*Dr. Rathin Rathinasamy*, my advisor,
for allowing me to dip into his wealth of knowledge about
the markets and methods of conducting research.

I am deeply indebted to
*Mr. Tom Charles* for his efforts
in collecting and analyzing the data.

My heart overflows with love and appreciation for
*Ms. Shelly Reis*, my fiancée, for her moral support
during the duration of this project.

## Abstract

Short selling has had a very controversial existence. Bear raids and short and distort schemes tend to be the extent of the typical investors knowledge of short selling. Negative public opinion toward short-sellers ebbs and wanes as the market falls and rises. However, at best short sellers act unnoticed and during the worst times they become pariahs for the negative effects of down markets. Unbiased information about short selling is rare. This paper looks to uncover the truth behind short selling and serve as a counter to the negative public opinion of short selling.

Several academic journal studies on short selling are examined to determine whether or increases in short interest volume precludes a down market or visa versa. Also examined in detail are the effects of regulation on short selling. Results from the academic studies are mixed; however, most studies lean toward the idea that short interest volume has no effect on the market. A few conclude that down markets tend to follow short interest. Only one concluded in favor of increases in short interest precluding a bull market.

This study of NASDAQ technology stocks examines whether or not the release of short interest information triggers reaction in the prices of technology stocks. This reaction is measured in three tests involving, independently: short interest volume, short interest ratios and market value. These tests answer the question: is the level of short interest volume a predictor of future returns in technology stocks?

Three conclusions are drawn from the study. First, on the day prior to the release of short interest information, NASDAQ technology stocks generate unexpected positive returns, and on the date of the release of the short interest information and the following day unexpected negative abnormal returns are generated.

Second, short interest volume appeared to predict future abnormal returns. The short interest ratio failed to be a predictor of abnormal returns. Abnormal returns appear again when market value is used as the determining variable.

Third, some conclusions can be drawn about the pattern that appears in the market value study. It appears that the market processes negative information about stocks with the largest market value over the short-term, in the day following an announcement of short interest. However, it appears that negative information takes longer to process for stocks of mid-to-large market value.

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# The Stock Market and Short Selling: Mechanics, History, Regulation, Motivations and Effects

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"I'm a trader, not a short-seller" – John Fiero[1], head of the Fiero Brothers, a firm recently expelled from NASD for fraudulent short selling, extortion and manipulation of the securities markets.[2]

"(Short seller?) I don't like the name. I consider myself more of an accounting critic." – David Tree, manager of the Prudent Bear Fund.[3]

## Introduction

Short selling has been around as long as there have been markets and has had a very controversial existence. Most casual investors do not practice short selling because of the tremendous costs involved; however, short selling still is practiced by an elite few and it remains a source of controversy.

Negative public opinion toward short-sellers ebbs and wanes as the market falls and rises. In periods of stable markets, the short seller is able to conduct his activities relatively unnoticed by the public. However, in times of falling markets, short sellers become pariahs, accused of depressing stocks through market manipulation and the force of will.

Immediately after the September 11th 2001 attacks on the world trade center towers, the SEC began looking at short-selling activity for impropriety. It was found that there was an abnormal buildup in the short interest of airline, cruise line and hotel chain stocks prior to the attacks. Short interest is the number of shares sold short in a market or of a certain issue of stock. It was suspected that those who knew about the imminent attacks on the World Trade Center had planned on profiting on the suffering of business associated with travel because of the fear that the attacks created in travelers. The SEC and FTC immediately started looking into those who shorted the 30 or so stocks in question, searching for a connection between the short-sellers and the terrorists. After months of searching, the SEC and FTC had nothing to report on. It seems the build-up of

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[1] Weiss, "The Secret World of Short Sellers" Business Week (August 5th, 1996) Online. www.businessweek.com. March 1, 2001.
[2] Condon, Nancy. "NASD Regulation Bars John Fiero, expels Fiero Brothers, Inc., and imposes $1 million fine for illegal short sales, market manipulation and extortion. Online. http://www.nasdr.com/news/pr2001/ne_section01_003.html. January 8, 2001.
[3] Brooker. *People.* Fortune, April 4, 2002. vol 145 – 5. pg 34.

short interest was a result of pessimism due to weakening in the overall market, and the decreased amount of expendable income that would be available for traveling activities as a result of higher unemployment. The short sellers were cleared of wrongdoing by the government, but their reputation in the public's eyes was once again greatly tarnished.

Short selling is commonly seen as unpatriotic because the short-seller profits on a stock's drop in price. Public opinion says that short-sellers gain at the typical investor's expense, for the typical long investor loses when the short seller wins and vice-versa. The public sees the short seller as a cheerleader for bear markets and a proponent of other people's suffering. Are these the truths or just misperceptions?

In the past 50 years of the study of finance, many have studied short selling. They attempt to identify the effect the short seller has on the market through his actions. They look to determine his motives and the factors that make him commit to selling short. They also look at short selling regulation and how it has affected the operation of the financial markets. This paper will look at short selling in depth. What is short selling? How is short selling regulated? How does short selling regulation affect the operation of the market? Do short-sellers operate unscrupulously? What effect does short selling have on the market? This paper examines these questions.

## Mechanics of Short Selling

Fundamental short selling is a market transaction that occurs in reverse order of the typical long buy-sell transaction. Long investors purchase shares of stock on the open market, wait for a price increase and then sell their shares at a higher price than they bought it, thus profiting from the increase in price. Short-sellers, on the other hand, sell shares, wait for a price decrease, and then buy them back at a lower price, profiting from the decrease in price of the securities.

How do short sellers sell stock that they do not own? Short sellers must borrow the stock that they wish to sell from another investor who owns the stock. Next, they sell the shares that they borrowed. Later they purchase shares (hopefully at a lower price than the price at which they sold them) to replace the borrowed shares. For example, Mike Thompson believes that the XXX Co. has a poor future. Mike believes that within a year XXX Co. will be bankrupt and the stock will be worthless. In order to capitalize on this premonition, Mike borrows 100 shares of XXX Co., now at $35 a share, from his

friend, Will Cagle. Will lets Mike borrow his shares of stock on the condition that Mike will return the 1000 shares of XXX Co. at Mike's convenience or when Will requests the return of the shares. Mike sells the borrowed shares to another investor, Wade Harrington. Mike collects $3,500 from Wade for the stock. A year later, Will has not requested his stock back and XXX Co. declares bankruptcy. Now, anyone can buy shares of XXX Co. on the market for $1 a share. Mike purchases 100 shares of XXX Co. for $1 a piece, at a total cost of $100, and delivers the shares to Will to replace the shares he has borrowed. Mike has a profit of $3,400 ($3,500 inflow - $100 outflow) on this series of transactions.

Of course, Wade is not too happy about investing in a stock that lost over 3000% of its value in a year and Will is probably banging his head against a wall for holding on to XXX Co.'s stock so long, but they both made a conscious choice to invest the particular way they did. This is an overly simplistic look at the mechanism of short selling, and when market makers, middlemen and regulators are added in the mix the process becomes more complicated.

What would cause someone to want to short sell a stock. The easy answer is that if a stock has a dismal future or is over-valued, it is a good short sale target. However, there are other considerations that will be discussed in detail further in the paper but should be mentioned now. Portfolio theory and modern portfolio management has created a use for shorting stocks. Short sales can be used to hedge positions in securities other than the security being shorted. Sometimes short sellers will take opposite positions on two stocks in the same industry in a similar move called *pairs trading*. Also, arbitrageurs can short sell stocks to lock in profits when there is a price discrepancy in similar financial instruments, whether those be long positions in stocks, puts or calls or convertible bonds. Some people short stocks to defer the payment of capital gains tax to a later year but lock in a given price on the stock. This is commonly referred to as *shorting against the box.*

The total number of shares shorted, or *short interest*, in a particular stock is measured by each of the exchanges and by NASDAQ for the over the counter market. These measurements are published monthly in the Wall Street Journal (WSJ) around the 22$^{nd}$ or 23$^{rd}$ of the month. Only positions of at least 1,380,000 shares shorted or with a

change of at least 580,000 shares from the previous month are published. On average, the short positions in a given firm do not exceed 0.5% of their total outstanding shares[4]. A popular measurement of short interest is short interest divided by total outstanding shares. This is called the *short interest ratio.* The short interest ratio is published along with short interest in the WSJ. The short interest published on the 22nd or 23rd is actually compiled on the 15th of each month by the exchanges. But, because settlement can take up to five trading days the actual date of event for published short interest is the 8th, 9th or 10th of each month.

The simplistic example of short selling that was given earlier is missing a couple of key pieces. First, it was assumed that Mike could just borrow his shares directly from Will. A transaction like this does not normally occur. Mike would actually contact his broker, Jeff Williams, at Williams Brokerage House, and tell Jeff that he desired to sell 100 shares of XXX Co. short. At this point Jeff would check on the availability of XXX Co. shares for Mike by first checking in his customers' margin accounts for shares to borrow or his hard to borrow list for NASDAQ shares. Exchange rules (NYSE Rule 440c.10 and NASD Rule 3370) require affirmative determination be made prior to execution of a short sale order that actual shares are available to borrow and can be delivered on the settlement date. NASD has approved the use by member firms of a hard to borrow list. If a firm's shares aren't listed among the hard to borrow shares, then their absence from the list will satisfy affirmative determination.[5]

If Will Cagle has his stock with Williams Brokerage House held in a margin account, Will has probably signed a document allowing Williams to store and use the actual paper shares of stock. The brokerage house can use Will's shares in any way they see fit as long as Will's position in the stock is not compromised. (A margin account allows Will to borrow from Williams in order to buy more shares than he can actually afford, or for which he wants to buy with his own money). Let's assume that Will has his shares in a margin account. Jeff would then take the shares out of Will's account and sell them on the open market for Mike.

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[4] Dechow et al: 86

[5] NASD Notice to Members 00-28 "SEC Approves Use OF Hard To Borrow List To Comply With The Affirmative Determination Requirement For Short Sales (Rule 3370). May 2000.

Jeff cannot just sell XXX Co.'s shares on the market whenever he wants. The NYSE, Amex and NASDAQ all have rules that state short sales can only be made on an uptick or an even uptick in a security's price. This regulation is a result of past practices by short sellers that created heavy downward pressure on a stock's price. Today, consecutive short sales can only be made a successively higher or successively the same prices. An uptick occurs when a stock's current bid price is higher as a result of a past transaction. An even uptick is when a transaction takes place and there is no change in the bid price of a security, but the last change in the bid price was an uptick.

Getting back to the example, next, Jeff approaches a market specialist that deals in XXX Co. stock. Jeff sees that XXX Co.'s bid price is at $35 a share. This is higher than bid of the previous transaction of $34.50. Jeff now executes the trade selling 100 shares of XXX Co. stock to the specialist for $35 a share, and collecting $3,500. What would happen if $35 was not an uptick? Jeff could not legally make the sale. In this case he could place a *market order* with the specialist that says at the next uptick the trade should be executed. However, if the price continues to drop say all the way until $20 dollars before there is another uptick, then Jeff would only be getting $2000 for the 100 shares for Mike. This might not be what Mike wants. Jeff could also place a *limit order* that would allow him to execute the trade the next time the stock hits $35 dollars or higher on an uptick. However, the limit order may not ever be executable at the $35 or higher price.

Assume that Jeff has completed the transaction, and collected the $3,500, what now? Jeff now puts the $3,500 in Will's account as collateral for the stock that Mike borrowed. In the simple example, Mike was able to keep the money that Jeff collected However, as a result of SEC regulation, Mike cannot have use of the proceeds of his short sale. Mike will actually have to deposit 50% of the value of the shares sold as assurance that if his idea is wrong, and XXX Co.'s stock price rises, he will have the money to repurchase the shares for Will at a higher price. Mike not only doesn't have use of the proceeds of his short sale while it is open, but he is required to deposit 50% extra. Not being able to reinvest the funds of the sale and requiring to put 50% of the total of the amount of the sale into a margin account are the first two costs of short selling that we see. Both are costs are related to the opportunity cost of not being able to use the $5,250

($3,500 sale proceeds for collateral + $1,750 margin) for other purposes. These costs make the short position much different than being just the opposite of the long position. At the time of the sale, Mike has 150% of the funds tied up in his short position in XXX Co. that Will has in his long position. A saving grace for Mike is that he is allowed to use Treasury bills or other securities that he may already have invested or wishes to invest as margin for the 50% that he is required to invest. Therefore, he can still earn interest on the 50% margin, although he loses the freedom to reinvest the money in things other than cash, stock, bonds or treasury securities-things that he can keep in the margin account-until he closes his long position. For example, if Mike's money was better spent opening his own business or buying a car for his child, the 50% margin requirement would be a real cost to Mike, even though he may have invested the margin in income producing securities. The real costs of the 50% margin requirement are the opportunity costs of reinvestment. The opportunity cost of the margin requirement is minor compared to the costs of the restrictions on reinvestment of the proceeds of a short sale. Studies by Figlewski (1981) and Alexander (1997) show that the restriction on the reinvestment of short sale proceeds is the largest obstacle to efficient short selling.

A third cost to Mike is that Jeff will most likely request from Mike a fee for his services. He may ask for a percentage of the dollars invested and/or take the interest from investing the money that he is holding in Will's account as collateral. Jeff and Williams Brokerage House can choose to share with Mike the interest that he earns on the collateral. This is called a *broker rebate.* Informed short sellers negotiate a broker rebate for themselves from their broker. Usually, the percentage of the rebate is a few points less than what is actually earned on the funds invested so that the broker can keep some of the interest as a fee for himself. A broker rebate can help offset some of the costs of not being able to invest the collateral elsewhere.

When the Jeff borrows stock from Will for Mike and sells it to Wade, two sets of the same shares of stock are created. Wade now holds the actual shares of XXX Co. and he is on record with XXX Co. as being a stockholder of 100 shares. What happened to Will's position? Will still owns shares in XXX Co.; however, the shares he owns are virtual shares. He no longer has the certificates in his name or account. Will owns shares by virtue of the fact that Mike is indebted to him to replace his shares.

What happens if there is a dividend? The short seller is required to support the stock that he created by borrowing. In this case, Mike is required to support the stock that Will virtually owns. If a dividend is declared and issued, Wade will receive a dividend from XXX Co. as he is the shareholder on record. Will must receive the dividend also. His dividend will come from Mike. Mike is required to issue a dividend to Will. This will come out of Mike's margin account. If Mike's margin falls below a certain level set by Williams Brokerage House (usually 30% of the value of the shares shorted), he will be required to put forth more margin in what is called a *margin mainenance call.* What if there is a stock dividend or split? Theoretically in a stock dividend or stock split, no value is created therefore the stock price will decline relative to the amount of the split so no compensation will be required to be made. [6] However, the market does not always follow theory, so sometimes a stock will automatically increase in value as a result of the split. Once again, Mike is required to compensate Will for what he is missing out on by not holding the stock certificates. Compensating the lender for dividends and splits is a fourth cost of selling short.

In summary, a short sale is the opposite of a long sale. The short seller wishes to sell high then buy low. Regulation makes short selling more than just the opposite of long selling. Short selling regulation places significant costs on the short seller. Long sellers do not have to face many of these costs. First, the short seller does not have use of the proceeds of his sale until he closes his position. Second, he must put forth an additional 50% as margin on his position in case the price rises rather than declines. Third, he must pay the broker a fee for his services. Fourth, he must compensate the lender of the stock for any dividends that are declared and issued. These costs pose significant barriers to short sellers and are prohibitive so that only a privileged few can reasonably expect to participate in short selling.

## Regulation of Short Selling

Short selling occurred in the early days of the stock market relatively uninhibited. Short selling was blamed for much of the chaos that caused the stock market crash of 1929. After the crash, pressure was put on the government to regulate short selling. *Bear*

[6] Walker. Selling Short. John Wiley and Sons, Inc., New York. 1991. pg. 78.

*raids* are one way that short sellers were able to take advantage of market mechanics and unfairly profit before the Securities Exchange Act. Bear raids are short selling induced price declines. Often bear raids were aided by naked short sales (discussed in the next section). As more short sales are made, more virtual shares of a stock are created, and therefore, the supply of the shares increases. As basic economic theory says, an increase in supply, with no change in demand can only result in the same or a lower price. Bear raiders make short sale after short sale in order to drive the price of a stock as low as it can go. Then the raiders cover their positions at the lowest price, thereby profiting from their short sales by virtue of the number of virtual shares they create. The newly formed SEC introduced controls on the exchanges to curb short selling abuses. The SEC wrote the several rules that pertain to short selling. Rule 3b-3 defines short selling as "any sale of a security which the seller does not own or any sale which is consummated by the delivery of a security borrowed by, or for the account of, the seller."[7]

Rule 10a-1 of the Securities Exchange Act created the uptick rule, which prohibits investors from selling a stock listed on an exchange short unless the stock's last trade was higher than the previous trade or at the same price as the previous trade but higher at the last significant price change. For example if the current trade price is $10 for a share of stock and the last price was $10, short sellers have to look to the next previous price fto satisfy the uptick rule. If the next previous price is $9, then the short seller can make a trade. If the next previous price is $11, the short seller cannot execute his trade. If the next previous price is $10, the short seller must check the next previous price for an uptick, and so on. Both the NYSE and NASDAQ have adopted their own rules with a similar effect, Rule 440B and NASD Rule 3350, respectively.[8]

The SEC has outlined three objectives for the uptick rule.

1. Allow relatively unrestricted short selling when a firm's stock is advancing.
2. Prevent short selling of a firm's stock at successively lower prices.

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[7] General Rules and Regulations promulgated under the Securities Exchange Act of 1934: "Rule 3b-3 – Definition of "Short Sale"" *The Securities Lawyer's Deskbook.* Online. http://www.law.uc.edu/CCL/34ActRls/rule3b-3.html.

[8] "Short Sale Restrictions" U.S. Securities and Exchange Commission website. Online. http://www.sec.gov/answers/shortrestrict.htm. March, 2, 2002

3. Prevent short sellers from accelerating a declining market in a firm's stock by exhausting all bids at a given price level.[9]

A study done by Alexander and Peterson (1997) shows that the uptick rule seems to have an adverse effect on short selling in advancing markets. In advancing markets, short sales of stocks with a bid-ask spread of 1/8 during the study were executed at the bid only 13.1% of the time. The other orders were either executed later as a limit order or cancelled.[10] Eighty-nine percent of short sell orders in 1/8 point markets could not be immediately executed because the minimum shortable price was greater than the bid price.[11] The study shows that the uptick rule delays or prohibits the execution of more than 90% of all short sale orders. In addition, only 74% of short sell market orders submitted on an uptick were executed while 99.4% of regular sale orders submitted on an uptick were executed.[12] These are examples of how Alexander and Peterson demonstrate that the uptick rule does not achieve it's first objective, that is to allow relatively unrestricted short selling at advancing prices.

Another interesting finding of Alexander and Peterson's study is that short sellers usually disregard tick status when placing a short sale order.[13] Short sellers are governed by the tick status in the execution of their trades, but they submit orders at ticks in both directions.

NASDAQ adopted an uptick rule on its own accord. The Securities Exchange Act only governs the organized exchanges. Over-the-counter transactions are exempt from SEC regulations. When the SEC adopted 10a-1 in the 1930's there was no way to monitor the over-the-counter market efficiently. NASDAQ did not adopt an uptick rule 3350 until 1994.[14] NASD adopted Rule 3350 in order to prevent short sellers from selling stocks on their system at consecutively lower prices. The uptick rule for NASDAQ prohibits NASD members from selling short in NASDAQ stocks at or below the inside best bid when the best bid is lower than the previous inside best bid for that stock. Originally there must have been a 1/16 or higher uptick in order to short sell.

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[9] Alexander: 91
[10] Ibid: 98
[11] Ibid: 101
[12] Ibid: 102
[13] Ibid: 101
[14] Albert, Smaby, and Robison: 28

NASDAQ updated rule 3350 in March of 2001 to change the uptick increment to $.01 for decimalization.[15] During a down bid, short sales can only be executed at $.01 above the current best bid. The inside best bid is the highest bid by all market makers quoting a particular stock.

SEC rule 10b-4 governs short selling and tender offers. All tender offers must be made on a long sale. Tender offers mostly occur during takeover bids-hostile or friendly. Usually, the person or entity who wishes to takeover another company will offer to buy the shares of the target company at a premium. After a tender offer is made and completed and the target is acquired or the tender offer fails, the stock in the target company drops in price, reflecting the loss of the premium that was offered for the stock during the tender offer. Short sellers are not permitted to capitalize on this drop in price by selling short stock to the entity making the tender offer and then covering the sale after the price decline.

*Naked short selling* has been outlawed in the U.S. markets. Naked short selling occurs when investors sell shares short with out confirming that they can obtain the shares that they wish to sell. Naked short sellers hope to close their position before there will be a need to deliver the shares. In this way, the naked short seller avoids borrowing the shares altogether. This causes many problems, one of them being increasing the volatility of the overall market. The volatility is created when the naked short seller cannot find someone to borrow the shares from when he needs to cover his position. If he has trouble finding a buyer and must cover his position, the buyer can make his own price, probably a high one, damaging liquidity and creating a *short squeeze.*

Ko Securities was fined $150,000 for naked short-selling 46,000 shares of EntreMed stock. Ko insisted that by covering the transaction at day's end they had met the requirements of the affirmative determination rule. On May 3, 1998, the New York Times published an article discussing that EntreMed had completed successful clinical trials for two cancer battling drugs. On May 4th, EntreMed's share price opened at $85 compared to $12 at the previous close. Ko shorted 46,000 shares at the inflated price and covered near the end of the day at $51. EntreMed's previous day's volume was 19,150

[15] "SEC Approves Short Sale and Manning Rules for Decimals" NASDAQ TRADER website. 3/6/02 http://www.nasdaqtrader.com/trader/news/2001/headtraderalerts/hta2001-34.stm

shares. A NASD Regulation Hearing Panel shot down Ko's argument insisting that their actions were inconsistent with the purpose of affirmative determination of providing "additional discipline on short selling".

The SEC has also imposed rules for preventing short sellers from manipulating securities offerings. Rule 105 of Regulation M prohibits the covering of short sales with securities obtained from an underwriter, broker, or dealer that is participating in a securities offering.[16] This rule is necessary because the underwriter, broker or dealer can obtain new shares at a discounted price and will often offer new issues to the public at a discounted price to the market price. A short seller could take advantage of the discounted price by selling shares short before the new issue and then covering the old issue stock with stock from the discounted new issue.

As shown by the Alexander and Peterson study, the uptick rule is quite effective in preventing selling at successively lower prices. The uptick rule has effectively ended the threat of a bear raid.

Are there drawbacks to short selling regulation? Hurtado-Sanchez (1978) studied the effect of the uptick rule on risk and return in the market. Hurtado-Sanchez found that short sales serve to bring down the price of stocks to make their returns commensurate with their risk. Hurtado-Sanchez's study concludes that short sale restrictions prevent short sellers from bringing down stock prices so that their return becomes commensurate with their risk.[17] Therefore, the uptick rule margin requirements, and the inability to use funds generated by on short selling cause some stocks to be over-priced compared to their risk levels. For example, if a stock provides excess returns in a given month, m, from month m to m + 1, the short interest will increase in order to bring returns in line with risk. Under current regulation short selling cannot accomplish this.

Short sales can prevent the prices from increasing. By sending a negative signal to the market and/or exhausting all buyers at a particular price, short sellers can also keep long sellers from selling at higher prices or give them a signal sell at a lower price. This indirect way for short sellers to influence the stock price is not nearly as effective as being able to sell at successively lower prices. Therefore, the ability of the market to

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[16] "Short Sale Restrictions" U.S. Securities and Exchange Commission website. Online. http://www.sec.gov/answers/shortrestrict.htm. March 3, 2002.

[17] Hurtado-Sanchez: 980

absorb the information provided by the short sales is compromised by the existence of the uptick rule and the constraints of restrictions on the reinvestment of short sale generated funds.

Figlewski (1981) studied the effect of short selling on the equilibrium price of stocks. Figlewski developed a demand function that considers short selling and a supply function that consists of total shares outstanding and virtual shares created by shorting. The demand function shows that the total elimination of short selling as a market function creates excess demand at the previous market clearing price (i.e. the market clearing price w/ short selling). This causes the equilibrium price to be bid up to a higher price. Supply and demand curves are formed on the idea that they represent all available information. If the short seller's informational effect is eliminated, only the long seller's informational effect remains. Without short selling, realized returns to the long investor, on average will be lower than anticipated.[18] This is the scenario in a market without short selling; however, this line of thinking can be expanded to a market with severely regulated short selling. Fewer investors will attempt to short stocks and the market will be hampered in the same way, albeit less drastically, as the market where short selling is extinct.

Woolridge and Dickinson (1994) found that higher beta stocks have significantly larger short interest ratios and significant larger variability in their short interest ratios on NASDAQ compared to NYSE and Amex during their study period.[19] Their study period was pre-NASDAQ Rule 3350. These results seem to affirm that in a less regulated market there is more liberal trading with short sales, resulting in more short interest movement in either direction. Their work also shows that stocks with higher risk are shorted more than stocks with lower risk. This phenomenon is similar to what happens in the options market where options volume tends to be larger for higher beta stocks. If the stock is likely to make a drastic turn then it is more attractive to short.

Figlewski (1981) believes that existence of tradable options may reduce some of the negative effects of short selling constraints on the market. For example, a trader with an unfavorable opinion of a company's outlook can buy puts or write calls in order to speculate on the future movement of the stock price. This information about puts and

[18] Figlewski: 473
[19] Woolridge and Dickenson: 27

calls will affect the valuation of the underlying stock, thus incorporating the unfavorable information, indirectly.[20]

Hurtado-Sanchez (1978) believes that the market imperfections caused by these barriers to short selling are significant enough to warrant the easing of restrictions on short selling, including the abolishment of the uptick rule, margin requirement, and the restriction on the use of short-sale proceeds.[21] One possible argument for the abolition of these restrictions is the depth of information available to build a case against those who criminally manipulate the financial markets. The electronic records of individual transactions are extraordinarily detailed today compared with what was available during the time in which today's short selling regulations were drafted. Today, the technology exists where orderly markets can be maintained by the threat of prosecution rather than by restrictions that create inefficiencies. As a counter to that argument, prosecution in the U.S. justice system can be a long process. By the time that the system could respond to abusers of short selling, the damage may already be uncontrollable.

As there are reasons for abolishing short selling regulations, there are also reasons for keeping them in effect. First, investors can only manufacture a bear raid without an uptick rule. It is impossible to execute a bear raid when you cannot short sell at consecutively lower prices. Secondly, the regulations restrict short selling to more informed investors. If making a short sale was as easy as making a long sale in every way and all investors used short sales in trading then volatility might increase as the average investor could then not only hype up a stock, but hype down a stock as well. Thirdly, the Hurtado-Sanchez work is not exhaustive. We do not have any real working models for how the financial markets without short selling restrictions would function in today's economic and informational climate. Fourthly, Woolridge and Dickenson (1994)found during their examination of Amex, NYSE, and NASDAQ during the pre-NASD Rule 3350 that there were no significant differences in the test results between any of the three markets examined. They concluded that the uptick rule has no significant effect on the price fluctuations in the markets.[22] Therefore, there is no need to alter the

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[20] Figlewski: 475
[21] Hurtado-Sanchez: 980
[22] Woolridge: 26

uptick rule in markets that have it and no need to establish an uptick rule in markets that do not use it.

Due to frequent requests of relief from the short sale rule and a general sense that short sale regulation may be antiquated, on October 20, 1999, The SEC issued a concept release and a request for comments the alteration of Rule 10a-1. The specific concepts that they solicited comment on are:

- Suspending the short sale rule when the security or market is above a threshold price;
- Providing an exception for actively traded securities;
- Focusing short sale restrictions on certain market events and trading strategies;
- Excepting hedging transactions from short sale regulation;
- Revising short sale regulation in response to certain market developments;
- Revising the definition of "short sale";
- Extending the short sale rule to non-exchange listed securities; and
- Eliminating Rule 10a-1

No action has been taken on this concept release yet. However, this release demonstrates that the SEC is willing to change short selling regulation in response to how it affects the markets, market makers and investors. Unfortunately, as with a 1976 investigation into short selling a majority of the comments published on the SEC website appear to be negative. The SEC received 12 comment letters in response to a series of proposals to ease short selling restrictions in 1976. Eight commenters including the NYSE and Amex opposed changes in regulation. Once again, changes in short selling legislation may get swept aside because of the negative attitude toward short sellers. A 1991congressional report on short selling concluded that there is a psychological misperception that short sellers possess much greater manipulative power than they really do.

## History of Short Selling

The negative attitude toward short sellers has its roots at the beginning of the development of modern equity markets. Short selling's written past began in early seventeenth century Holland when joint stock companies were created to fund new

sailing ventures such as the Dutch East India Company. The hype surrounding these expeditions grew to extreme levels and the values of their stock were inflated to ridiculous amounts. Short sellers entered the market and began to speculate on the bursting of what would later be called the South Sea Bubble. Since there were no regulations on short selling at the time, short sellers were allowed to short sell at consecutively lower prices. Short sellers raided the market by shorting every share of stock that they could get their hands on. Short sellers increased supply and drove the prices of the stock of the sailing ventures down. At the same time the hype that drove the ascent of the stocks prices waned and the combination of the factors caused the bubble to finally burst. Sailing ventures' stock prices plummeted. The directors of the expeditions wrote to the government expressing their extreme displeasure with the short sellers who made money of their plummeting stock. The Dutch government decreed short selling in the Dutch markets was prohibited. This was the first known short selling regulation. The decree was for the most part ignored and eventually it was repealed.[23]

A similar situation to the South Sea Bubble occurred a few years later when a frenzy started in the market for tulips. This rather innocent looking flower caused much financial hardship when, after people who speculated on tulip bulbs drove the prices to extraordinary levels, a disease hit the bulbs and the crop withered and died. Again valuations plummeted and although happy and rich, the investors who sold tulip futures short ended up taking the scorn of those who lost money, even though their speculating did not have much to do with the fact that the valuations fell. The government tried something new and levied a tax against those who sold short to appease the ones who lost money.[24]

In 1867, the British parliament passed Leeman's Act, prohibiting short sales in bank stocks. This, like the regulations after the South Sea Bubble, was soon ignored and disregarded by businessmen and the courts. A French Royal decree in 1724 outlawed short selling by limiting legal market transactions to exchanges of securities in which the securities were in the possession of the seller.[25] This was the evolution of short selling

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[23] Staley: 235-6
[24] Idid: 236
[25] Ibid: 237

regulation. From outlawing to taxation, many techniques have been used to impair short selling activities.

Short selling in the United States has a past marred by scandal. Short sellers began to enter the U.S. exchanges *en force* in the late 1800's when speculation on railroad stocks reached their peak. Some investors attempted bear raids on railroad stocks during this time period, inflaming other investors who held these stocks long. It was during these times that the long sellers came up with an equally devious counter to the bear raid called a *corner*. A corner is a short squeeze where the available supply is held by one or two entities. This allows for great price control by the entities that have physical control of the stock. [26] Basically, a long seller that identified a potential bear raid, or even sometimes no bear raid, just a large amount of short interest, would purchase as many shares as he could from the short sellers who were selling the stock and other long sellers. After the long investor controlled a significant amount of stock, he would encourage an investor who had loaned shares to the short sellers to demand return of their stock. Since short sellers must deliver the physical shares within five days, when the short seller went to the market to find shares to replace the shares he had borrowed, he found the entity that orchestrated the corner would be the only place to buy physical shares. Therefore who ever held the shares could demand whatever price he wanted from the short sellers. Often the price the entity demanded would be ten-fold or larger from whence the short seller started selling. On more than one occasion the exchanges had to intervene and force a settlement between the parties. Usually, both the short sellers and the entity that created the corner were punished.

All short selling abuses aren't confined to outsiders of the company. In 1929, Albert Wiggin, head of Chase National Bank, shorted 42,000 shares of his company's stock. His trades were legal at the time but they were obviously not in the interest of the shareholders, which he represented as an executive of Chase. This abuse led to an SEC rule that prohibits executives from shorting shares of the company where they are employed.[27]

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[26] Ibid: 238-9

[27] Florian, Ellen. "Schemers and scams: a brief history of bad business" Fortune vol. 145 no. 6 (March 18, 2002): pg. 62 – 3.

Today's short selling regulation was developed as a result of the stock market crash of 1929. Congress looked into short selling but could not reach a conclusion about how to regulate it. So congress granted the SEC broad powers to regulate short selling. The short selling regulation discussed in the previous section was developed in the 1930's and has remained virtually intact since then.

## Strategies of Short Sellers

There are several reasons for short selling. Particular strategies exist that are used to identify stocks as good short sale targets. A study conducted by the NYSE in 1947 identified the speculative motive as responsible for two thirds of total short interest. [28] Hedging and arbitrage, not speculation, are the two primary reasons to short sell today.

The most notable purpose of short selling is speculation. It is this type of short selling that creates the wrath toward short sellers and makes newspaper headlines. If an investor believes that a stock is overvalued or will see a drop in its value in the near term, they can short sell the stock in order to profit from its loss of value.

It is well established in financial circles that speculative short sellers excel at research. Often, short sellers are the hardest working investors because there is much more at stake in a short sale then there is in a long sale. In a long sale the most an investor can lose is the amount their investment. In a short sale an investor's losses are only limited by the highest price that a stock can reach. Theoretically, a stock's price can rise to infinite levels. Therefore, in theory, short sellers incur the risk of infinite losses.

Because of the risks of a short squeeze, short sellers usually limit their search for overvalued stocks to *large cap stocks* (commonly stocks with a market value of greater than $500 million) with a *float* (shares not insider owned and not in a portfolio that consists of over 5% of total shares outstanding of the firm's stock) of 10 million shares.[29] Short sellers are often very reluctant to disclose their positions for fear of a short squeeze that can occur as a result of a *buy-in*. Buy-ins occur when those from who the short sellers borrowed stock demand their physical shares be replaced. When this happens a short seller is required to find physical shares for the lender and replace them at the going market price. Buy-ins are rare because, with the use of margin accounts, brokers can

[28] McDonald and Baron: 98
[29] Staley: 16

easily shift stock certificates from one investor to another when multiple investors hold a particular issue. This keeps the short seller from having to close his position. Instead, the broker replaces the lender's shares with shares borrowed from another investor.

In a market decline, McDonald and Baron (1974) observed that higher beta stocks tend to produce higher profits for the short seller. This seems to be in conformity with the idea that riskier stocks produce higher returns. The long seller makes money during a market increase; the short seller makes money during periods of market decline.[30]

Executives from companies plagued with high short interest have attempted to squeeze short sellers by asking their shareholders to request delivery of their stock certificates[31]. This is a ploy used by management to keep their sinking stock afloat for as long as possible. Sometimes management can do real damage to short sellers positions, increase volatility, and decrease liquidity in the market for their issues by their actions.

Many times in the past short sellers have been correct with their picks of stocks that were overvalued and their choices of companies that were on the verge of collapse. In 2000, some short sellers were aware that Enron was in danger of collapse. In February 2001, a firm that specialized in shorting stocks called Bethany McLean of Fortune and in her words "suggested that I look at the company's financial statements and see if I could understand how the company made money."[32] Bethany wrote a story in late February 2001 for Fortune that was critical of Enron's accounting. Later in 2001, Enron fell into bankruptcy. Its stock is now almost worthless, fell from a high of $80 a share in just over a year.

What are some things that short sellers to look at to determine if a company is a good target for a short sale? Short sellers look toward both technical analysis and fundamental analysis to find short selling opportunities. Technical analysis is an analysis of past performance and future market trends. Those who use technical analysis may see high short interest as a sign that a stock is headed for failure and short those stocks. They may also short stocks that have reached their *resistance level.* The resistance level is a particular price at which a stock has reached multiple times but is unable to break

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[30] McDonald and Baron: 101
[31] Weiss: Online
[32] Interview. Bethany McLean and Jon Stewart. *The Daily Show with Jon Stewart.* Comedy Central. (February 20, 2002 11PM).

through. Usually, technical analysis is accomplished using charts and developing a resistance level, *support level* (bottom price from which a stock always recovers), and trend-line for a stock.

When searching for abnormal returns, McDonald and Baron (1974) and Woolridge and Dickinson (1997) both found that timed short positions under performed naïve short positions. They created a short portfolios of stocks used in their study with the highest levels of short interest during a given month and rebalanced that portfolio every month during their study to include the stocks with the highest levels of short interest from the issues used in their study. They also shorted a portfolio of all stocks with that they used in their study. They found that the random portfolios out performed the portfolio that had only the highest short interest stocks. These results suggest that shorting because a stock only because it has high short interest is not particularly wise.

Fundamental analysis involves examining the parts of a company's financial statements, the income statement, balance sheet, statement of shareholders equity, and statement of cash flows, for weaknesses. Fundamental analysis is usually focused on finding companies who cannot support their spending habits. Just like when a person consistently spends more money than she takes in is headed for bankruptcy, a company that consistently outspends its income is headed for disaster. Bankruptcy is the ultimate low for a company and typically results in a massive devaluation of the company's stock price. Obviously, if short sellers can predict the occurrence of bankruptcy reliably, they can profit from their knowledge by selling short an unhealthy company that is headed for bankruptcy before that knowledge has been factored into the stock price.

A weak *working capital* position is a sign that a company may be headed for trouble. Working capital consists of liquid assets and minus liabilities that are short term in nature (due in less than one year). Working capital is a measurement that says if a company's creditors were to call in their debts on the company and request payment immediately, could the company pay all the debts with the cash and other liquid assets that they have on hand. Weak working capital can increase a company's risk and make it a good target for short sellers.

During bad economic times, short sellers look for companies that are highly leveraged. Banks fund much of the operations of a highly leveraged company. If a

company is highly leveraged and its expenses from operations are greater than its revenues from operations, chances are good that when the company faces a decrease in operating revenues because of bad economic times the company will fail. In bad economic times, banks will be less generous with funding and companies which are highly leveraged already and have net operating losses, will no longer be able to pay their debts, much less support their operations.[33]

Firms with a low return on equity make for popular short selling targets. These companies have to go to the banks or the market to raise money to fund their growth quite often. Return on equity consists of net income available to common stockholders divided by total common equity. On the other hand, firms with high return on equity make for a lousy short sale because of their ability to fund their own growth.

Firms can fund growth in two ways. A firm with a low return on equity must fund its growth by issuing bonds, common or preferred stock, borrowing bank or seeking venture capital. A firm with a high return on equity funds its growth through internal operations by using retained earnings (the cumulative total of yearly net income not paid to common stockholders through a dividend). The issuance of bonds or borrowing from others increases the risk of the firm by increasing its interest payments and debt. The fixed nature of interest and retirement payments on debt decreases the ability of a firm to weather hard times and escape bankruptcy. In addition, issuing common or preferred stock creates an increased supply of stock on the market. The more stock issued, the lower price each consecutive issue will fetch, therefore creating downward pressure on the stock's price. The short seller welcomes either of the outcomes that low return on equity can create.[34]

Deschow et al (2001) found that short sellers tend to favor stocks with low fundamental-to-price ratios: cash flow to price, earnings to price, book to market, and value to market (the quantity book value of common equity plus the present value of future abnormal returns divided by market price). Their research shows that short sellers appear to use these ratios in order to identify stocks that are overpriced. They cover their short positions as the stocks' prices decline, thus bringing the stocks' values back in line

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[33] Walker: 123
[34] Staley: 108

with the fundamentals. This study helps confirm that the speculative motive for short selling exists and has a real influence on the prices of stocks. Deschow et al also discovered that short sellers make an active effort to exploit the predictable returns associated with shorting low fundamentals-to-price ratio stocks.[35]

Short sellers also scrutinize intangible assets for possible overstatements. Firms can improve their balance sheet by overstating the value of patents, goodwill, copyrights and other assets for which an exact value cannot be computed. Short sellers identify the firms in which intangible assets are overstated. Overstatement in and of itself is not a sound reason to short a firm's stock; however, it may be indicative of other things going on in the firm.[36]

In the insurance industry, short sellers look for items that eat away at an insurance company's *surplus*.[37] Surplus (assets minus liabilities and contributed capital) is a measure of the amount of assets that an insurance company has left over to cover unusual claims such as a natural (earthquakes, tornadoes, or hurricanes) or a man made (asbestos liabilities or the WTC attacks) disaster. A weak surplus position puts the company at risk for failure if a disaster hits. The insurance commission in the state in which an insurance company incorporates regulates the amount of surplus an insurance company must have. However, most insurance companies carry well above this amount of surplus. Short sellers usually set the bar for insurance companies higher than the state insurance commissions do.

Short sellers also try to identify firms with poor or unethical management. Managers with a reputation for sinking firms have a tendency to continue to sink firms until someone intervenes and stops them from managing. These are sometimes the hardest good short sell targets for a short seller to detect. Unethical managers tend to be very shrewd businessmen. Shareholders are not stupid. They would not place the managers in a position to manage the company without believing that the managers were good and forthright people. These types of managers often fool analysts into lauding their businesses. Short sellers are very much alone when they go after a target because of unethical management.

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[35] Deschow et al: 78-105
[36] Staley: 123
[37] Ibid: 139

Short sellers also look for mature industries that are undergoing some kind of revolutionary change, whether that change is heavy litigation or a sharp decrease in the demand for the product or service of the industry. When an industry is in this position, a short seller will pursue one of two strategies. She will short the marginal company or the institutional favorite. Marginal companies are companies with poor financials as discussed earlier, bad management or overly aggressive business strategies. The institutional favorite is the company that looks good but has a lot of institutionally owned stock. A high percentage of institutional ownership provides less risk for the short seller of a short squeeze. Also, institutional investors are usually slow to act on problem companies. The descent of the institutional favorite will tend to be slow to begin but very rapid once the institutional investors begin to divest themselves of the company's stock.

Pairs trading is a strategy that consists of a long position in a firm in a particular industry and a short position in another firm in the same industry. Ideally, a pairs trader will look for two companies that are highly competitive, where a market share increase and high profits for one equals a smaller share of the market and a drop in profits for the other. The pairs trader will go long on the firm that is expected to gain value and short on the firm that is expected to fall. The pairs trader will profit twice if his guess was correct.[38]

The bane of short sellers is the optimistic outlook of shareholders and lenders. Short sell targets usually hold out longer than the short sellers believe that they will. Slow acting institutional investors help create this problem. Institutional investors include pension funds and mutual funds. For pension funds, especially, changes in the composition of the fund must be approved through several different channels. These levels of approval can cause a time lag in the recognition of a company's weakness by the fund and the actual divesting of the company's stock that the fund owns. These time lags can support the stock's price long after it should have naturally fallen.

Creditors can be persuaded by management to continue to fund the cash flow of companies with little or no internally created cash flow. Companies that have been the targets of shorts in the past have held out three or more years before their management

[38] Pairs trading. Online. http://www.cms-forex.com/. April 12002.

finally ran out of places to find cash to fund their operations. Short sellers must be patient and have a high level of confidence in their predictions.

Once they identify a stock with weak financials or with non-existing or non-profit generating operations, it can take years for the company to run out of cash and for investors to run out of hope and start selling at lower prices. Short sellers try to estimate how long a company can survive on poor financials. Usually they underestimate the patience and generosity of banks and investors to keep a failing company a float. Banks ultimately choose when a company goes bankrupt because banks control the stream of cash that props up troubled companies.

Parkinson's Law of Short Selling states, "the stock price expands to fill the available short capacity and last iota of patience, particularly when it's a no brainer."[39] In other words, a stocks price expands as the latent demand created by the short sales increases and then, just when all short sellers are ready to accept their losses by throwing in the towel and close their positions at higher prices, the stock price peaks and begins its descent. According to Parkinson's law, this usually occurs when it's obvious that a company is headed for disaster.

It is a rule of thumb for short sellers that when analysts stop covering a stock (i.e. the stock has fallen so low that analysts believe that it is doomed) it is too late to short.[40] Short sellers often ridicule analysts for their failure to act quickly on the stocks of failing companies. Short sellers believe that most published analysts are too optimistic about the future of securities for fear that their firms will face the wrath of slighted management.

The depth and breadth of the short seller's research is beyond what most analysts perform for the following reasons. One, analysts usually cover a large number of issues and can only afford to spend time analyzing a particular issue a few times a year. Two, because short sellers take on greater risk than their counterparts who invest long in a stock, the short sellers must be more careful with their predictions. Many times, short sellers are way ahead of market analysts in predicting a stock's demise. The Enron example cited earlier is just one of many examples of when the short sellers beat the market analysts to the punch.

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[39] Staley: 179
[40] Staley: 120

## Short Sales and Hedging and Arbitrage Activities

The short interest as recorded by the major exchanges has been increasing steadily. In January of 1999 the amount of short interest on the NYSE was 1.9 billion shares. In March 2002, short interest on the NYSE was 6.64 billion shares. There are a number of reasons for this increase in short selling. First, the pure volume of trades overall has increased in during period. With more trading happening on the floor, some of that increase can be expected to be reflected in short selling transactions. Second, as investors have become more sophisticated they began to understand and use types of transactions different than the long buy and sell, including short selling. The more sophisticated investors also employ more sophisticated methods in their trading including hedging and arbitrage methods.

Today, only a small percentage of short interest represents the ideas of the speculative investor. A source cited in a 1996 article on short selling estimated that currently hedging and arbitrage activity by members and non-members represent 98% of the current short interest[41]. Exchange members, specialists and such are responsible for 80 – 85% of short sales. This may give a proper indication of the amount of short selling that can be attributed to hedging and arbitrage strategies, since most exchange members work to make markets and profit off of commissions, instead of trading for speculative purposes.[42] Hedging and arbitrage strategies are important because, the influence of institutional hedging and arbitrage as a reason for short sales may have changed the traditional relationships of short interest to market movements.[43]

Hedging and arbitrage activities that have led to the increase in short interest over time are shorting against the box, mutual (hedge) funds, pairs trading, and arbitraging options and convertible bonds. Hedging involves playing two opposite strategies in order to ensure that your investment is protected from movement in either direction. Arbitrage involves profiting off of momentary inefficiencies in the market represented by different prices for the same security. It is reasonable to assume that arbitrage and hedging are likely to occur more frequently on higher volume issues because the risks of a short squeeze are smaller and short sales are easier to execute.

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[41] Weiss: Online
[42] Woolridge and Dickenson: 22
[43] Staley: 17

Shorting against the box is a relatively well-known hedging strategy. An investor shorts against the box in order to insulate themselves from current period taxes. For example, Sara Richards is in the 38.5% tax bracket this year, but she plans to retire on December 31st. Next year, her income will put her in the 27.5% tax bracket. Sara purchased 100 shares of XXX Co. at $50 a share. In November of this year, XXX Co.'s stock reaches an all time high of $120 a share. Sara believes that this is as high as the stock will go and wishes to close her position and collect the profit; however, she would like to defer the capital gains until next year so she can pay 27.5% in taxes rather than 38.5%. Sara has her broker execute a short sale of her stock at $120, so at December 31st she has opposite positions open in the stock. When January 1st comes her broker uses her stock purchased at $50 a share to close her short position and Sara collects her proceeds, taxable at her new tax rate.

Similarly, shorting against the box can be used in order to defer capital losses when an individual's tax rate is expected to increase in the following tax period. An investor can also short against the box in order to defer short-term capital losses so they are not used to offset current period long-term capital gains (which are taxed at a lower rate than standard types of income) dollar for dollar.

Shorting against the box can allow an investor to take advantage of a temporary price decline in a stock[44]. For example, Sara from the above example cancels her retirement and XXX Co. reaches $120. Sara has reason to believe that the stock in XXX Co. is at a temporary high and will drop to $100 in the near future. However, Sara also believes that this drop will be temporary and after the stock falls, it will resume its ascent. Therefore, Sara doesn't wish to close out her position, just take advantage of the temporary drop, so she sells short at $120, keeping her long position, and closes her short position with newly purchased shares when the stock reaches $100. Thus, she maintains her original purchase of 100 shares at $50 the entire time. A temporary price drop in a stock could be caused by many factors. Natural disaster, national crisis, and legal liability are just a few factors that could cause a temporary drop.

Margin requirements for shorting against the box are different than for a normal long sale. The margin requirements are reduced to 5% of the current market value of the

[44] Walker: 62 - 3

long security. Shorting against the box typically occurs toward the end of a tax year and is represented by an abnormal increase in short interest.[45]

A study by Brent, Morse and Stice (1990)und that on average, a significant short interest decrease of 6.12% occurs in the month of January. They were unable to find significant results of a corresponding increase in November and December that would infer that a good amount of short interest change is explained by shorting against the box. However, although insignificant, rather large increases in short interest do occur in November and December. One reason that these increases may not be significant like the decrease in January is that those who short against the box can set their play up throughout an entire year, but they will almost always close it in January. They close it in January because there is not any benefit to shorting against the box except to postpone a gain or loss to a different tax year. Nothing is to be gained by postponing the closing of the transaction beyond January 1st, but a short against the box strategy can be set up any time from January to December.[46]

Specialists often use short sales to create liquidity in the issues in which they deal. For instance, if a buy order for XXX Co. was given to an XXX Co. specialist who believed that the price would fall in XXX Co. in the very near future, the specialist might go ahead and execute the order buy borrowing shares from those who wish to make a sale order at a higher price. When the price drops, the specialist can take a sell order that comes in and replace the borrowed stock. The specialist profits of the difference in price. Lest you think the specialist makes money off of this exchange without absorbing any risk, the specialist may lose on this deal if the stock price rises. However, specialists tend to know the stocks that they are covering very well and they can turn a transaction such as this into a profit more often than not.

Mutual funds are employed by many investors to diversify their portfolios without having to maintain a portfolio many different companies with only a few stocks of each company. There are three types of mutual funds that use short selling. Pure short funds use their assets to short sell only, indexes or individual stocks. Investors use pure short funds, called hedge funds, to insulate themselves from a down market. Market mutual

[45] Brent, Morse and Stice:. 275
[46] Ibid: 281

funds combine long and short positions to make steady returns regardless of the direction of the market. Thus in an up market one can expect that the market mutual fund will hold many long positions and in a down market, the market mutual funds will hold many short positions. A diversified fund permits its managers to make strategic bets that certain stocks will fail. Managers of these funds are allowed to speculate on the future of stocks much like a professional short seller. However, most of the assets of the diversified fund remain in long positions.[47]

A popular arbitrage move that uses short selling involves firm mergers and acquisitions. Typically, the lower priced stock of the two stocks involved in a (the target company) merger or acquisition will increase toward the price of the higher priced stock (the acquiring company) and the higher priced stock will decrease in price toward the lower priced stock. In order to arbitrage this difference, a trader can go short in the higher priced stock and long in the lower priced stock. This allows the trader to profit off of the coming together of the firm's share prices.

Convertible bond offerings are also used in a type of arbitrage strategy. For instance, XXX Co. convertible bonds are selling for $900 a piece and they are convertible into 20 shares of XXX Co. stock. If XXX Co. common stock is trading for $50 a share an arbitrageur would short sell 20 shares of XXX Co. for a total of $1000. Then he would purchase the XXX Co. convertible bond for $900 and immediately convert the bond and cover his short sale, recording a profit of $100 ($1000 - $900). Arbitraging situations like this are short lived, but a savvy investor with a close eye on the market can sometimes take advantage of this type of transaction. Other securities that can be used in similar types of arbitraging moves with short sales are preemptive rights, options and preferred stock.[48]

Many strategies exist that a short seller can use if a firm has tradable options. If a trader expects the price to decline in XXX Co., he can write a both a put and call option on XXX Co. and sell short shares of XXX Co. stock. If the price of XXX Co. declines, then the options offset each other and the trader benefits from any gain on the short sale. If the price increases, the trader is protected from losses up to the premiums earned on

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[47] Adiga, Aravind. "Funds that short" Money (July 2001): 82
[48] Walker: 58

writing both the put and the call option. In this way the trader protects himself from small fluctuations in the XXX Co.'s price.[49]

Brent, Morse and Stice (1990) regressed annual short interest outstanding in a particular issue by seven variables. The variables that seemed to have consistent explanatory power are beta, the existence of options, and the existence of convertible securities. There are a large number of arbitrage activities that can be performed by short selling and concurrently buying/selling puts and call options or buying convertible securities. Brent, Morse and Stice's findings show that annual short interest is related to the whether options or convertible securities exist for an issue and the beta of the given issue. This points to arbitrage motives as being a large reason for increasing short interest. The beta variable points to hedging also as an influence of short interest.[50]

Brent, Morse and Stice (1990) also developed time series models that show short interest and open options tend to move together through the options cycle. An options cycle is typically three months in length and the day after the expiration date of one option cycle is the beginning of the next cycle of options. For example, when an option expires in April, the months of February and March show an increase in open short interest. In April, short interest increases until the expiration date than decreases sharply during the expiration date and immediately following, then the next cycle begins and so on. As open interest in a stock's options increases, the short interest in the stock increases. This is more evidence that short selling for arbitrage purposes is a very significant motive for short selling.[51]

There is a type of transaction called a *short exempt transaction* that is exempt from the uptick rule. An arbitrage purchase of a convertible security and a short sale of a stock is a short exempt transaction. Because the investor can make immediate delivery of the shares via the convertible security, the trade is exempt from the uptick rule.

Hedging and arbitrage strategies influence on short interest is important, because when research considers short selling's informational effect, hedging and arbitrage activities dilute the informational effect. Most research on short selling considers that short sellers have some type of information not available to other investors. Whether that

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[49] Walker: 102
[50] Brent, Morse and Stice: 282-4
[51] Brent, Morse and Stice: 285

information comes from divine inspiration or as a result of their intense research, it doesn't matter. It does matter that hedgers and arbitragers have different reasons for short selling, which are entirely unrelated to the assumed superior knowledge of speculative short sellers.

Most studies that examine the effect of short sales, as measured by short interest or short interest ratio, attempt to control for hedging and arbitrage strategies. Senchack (1993) says "observed market reaction to short-interest announcements may be underestimated due to non-informational short sales associated with dividend-related strategies."[52]

## Corporate Attitude Toward Short Sellers

Corporate executives are alarmed when their company has a high level of short interest. Sometimes this alarm can turn into determination, where management attempts to fight the short sellers. This reaction is attributable to two factors. The first factor is the negative attitude toward short selling that is present in society. The second factor is that management probably sees high short interest as an indictment of their managerial skills.

Examples were given above of management corners where they attempted to profit off of a short squeeze by buying as many shares of their company as they could obtain and forcing a settlement price on the short sellers. This type of action is not tolerated in today's markets; however less greedy but equally sinister methods of punishing short sellers exist. Management has written letters to all shareholders of a given date, lamenting that their company that was besieged by short sellers and encouraging their shareholders to request that their shares be taken out of margin accounts, in order to force a buy-in and a short-squeeze on the short sellers. Management has also gone to the exchanges in order to seek retribution. A 1991 congressional inquiry that had a negative attitude towards short selling was brought about by angered management in order to make short selling regulation even more restrictive to the short seller.

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[52] Senchack: 185

Sometimes management has a right to be upset with the activities of short sellers. Unscrupulous short selling is easier today than it was 20 years ago because of the increasing use of electronic bulletin boards and email in order to share trading information. On-line trading also makes manipulation easier because a trader does not have to speak with a broker directly to make a trade. The broker can serve as a clearing house for information before on-line trading.

A method of unscrupulous short selling is similar to the market manipulative *pump and dump* for long traders. Pump and dump is an unethical practice that occurs when a trader can secure a rather large position in a very low priced and relatively unknown company. The trader will then pose as an officer of the company, an agent, or a member of the scientific community and encourage others to buy the company's stock by lying about the outlook of the company, results of the company's research, or a change in company management, sales or profits. The trader profits when the demand that he creates causes enough people to buy the company's shares and dramatically raise the price. The trader will then sell all his shares at a profit and attempt to disappear.

Short selling has a similar practice called the *short and distort.* In a short and distort, an individual will take a large short interest in a firm with a relatively small market capitalization. Then the individual will pose as an officer, analyst, agent or scientist and spread false information about the firm. The individual will then hopes that because of his misleading information, the price of the firm's stock will decline and he can cover his sales at a profit.

On August 25, 2000, a news release about Internet Wire reported that the company was under SEC investigation for accounting fraud and the imminent resignation of Internet Wire's CEO. The stock price Internet Wire dropped of 60% following the news release. Later, it was found that Mark Jakob who made $241,000 from the short sale of Internet Wire shares falsely created the report. Jakob was later arrested and convicted of market manipulation. He currently faces 3 years in prison and a half million dollars in fines and restitution.[53]

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[53]Unknown Author. "Former News Staffer Gets Jail Time for E-Posting Fake Press Release." Securities Litigation and Regulation Reporter. Vol. 7, No. 4 (September 12, 2001): 8

The fight between the corporate executives and short sellers is one that is fueled by hysteria, ignorance and the occasional scandalous act. Both sides of this battle are to blame for the conflict. Short sellers, although misunderstood, have a reputation for unethical practice due to the few who use methods such as the short and distort. Corporate executives have a misunderstanding of short sellers and short selling's function and effects on the market that create unnecessary tension. This misunderstanding is driven by the general negative attitude toward the short sellers because of their perception as the anti-bulls who profit off of everyone else's misery.

Are short sellers really anti-bulls? Sure, short sellers profit off of drops in a company's stock price, however; they do not profit off of drops in the stock prices of companies that they do not themselves short. A short seller's wish is to make money for himself, not to see people suffer. Therefore, it can be surmised that short sellers do not wish for down markets, rather they wish for stocks that they've identified as over valued and with low potential to fall.

Is it not more important to look at the short sellers effect on the market rather than their personal wishes anyway? The questions that should be asked before one makes up his mind about short selling are: Does high short interest in the market signal a future bear market or bull market? And if a stock has high short interest will it rise in price or will the price drop? These are questions over which much research has been completed in the past four decades and a definitive answer may not exist. The evidence for both the bearish case and the bullish case will be presented in the following sections.

## Is High Short Interest Bearish?

In a study that analyzed the NYSE from 1946 - 1965, Seneca (1967) contends that short sales predict future price downturns. Seneca believes that a high short interest ratio is not itself a causal factor of market prices, but an indication of other factors (based on economic, political and psychological issues) operating in the market. Seneca believes that short interest ratios represent investor confidence. When investor confidence is low, the market will decline.[54]

[54] Seneca: 70

Seneca revised his study in 1968, noting that the size of the short ratio is not the important factor, but the movement of the short ratio (growing or declining) is what should be noted. When the short interest ratio is growing then the market is expected to decline. The change in short interest ratio in Seneca's study is a product of the weighted average of the previous two periods. This is an attempt to eliminate anomalies such as shorting against the box type strategies.

Research by Figlewski (1981) on the informational effects of short selling also studied whether short selling provides information about the pricing of securities. Figlewski set up two portfolios, one long portfolio containing 207 of the lowest short interest stocks and a short portfolio containing 207 of the highest short interest stocks. Four hundred and fourteen stocks that had reported short interest and complete market information were examined from January 1973 to June 1979. The long portfolio produced a profit from positive excess returns for the investor. The short portfolio produced lower excess returns. When the short portfolio could be used as a low cost source of funding for the long portfolio, a higher rate of return would have been earned for the investor than if he would have been solely invested in the long portfolio. Figlewski found that excess returns are negatively correlated with short interest. Firms with high short interest ratios provide higher negative excess returns. Figlewski's study supports his hypothesis that prices of stocks for which there was relatively more adverse information among investors would tend to be too high.

Senchack and Starks (1993) explored short-sale restrictions their effect on the price of NYSE and Amex stocks. Senchack and Starks isolated those issues from NYSE and Amex, which had an unusually large change in short interest for their sample. They conclude that a negative market reaction occurs around the announcement date of a large unexpected increase in short interest. They found that the existence of tradable options reduces the attractiveness of short selling. Non-optioned stocks tend to react more strongly to change in short interest. Senchack and Starks shows that short-term negative abnormal returns tend to be less negative if a firm has tradable options. Since options provide another method of speculating, fewer investors speculate using short selling when options are available.

Senchack and Starks also note the small firm effect exists in short selling. Senchack and Starks utilized a model that included a variable for the availability of information about a firm. They found that firms with less information available about them (typically firms with a small market capitalization) have an enhanced reaction to a large change in short sales compared with larger firms that attract more media and analyst coverage.

Choie and Hwang (1994) studied the profitability of short selling and the exploitability of short information. They analyzed 36 months of statistics, from January 1989 through December 1991. They examined four categories of change in short interest of NYSE listed stocks (largest change, largest percentage increase, largest position, and largest short ratio). The authors measured the closing stock prices twenty days following the announcement date of the short interest statistics. They concluded that those issues with a large reported short position under perform the S&P 500 on average. The authors made no attempt to control for non-informational short selling (hedging and arbitrage). Choie and Hwang believe that if it were possible to control for these factors that those with a large amount of informational short sales would under perform the market to a greater degree.

A study by Albert, Smaby and Robison (1997) computes the mean cumulative abnormal returns on Amex, NYSE and NASDAQ stocks. Negative abnormal returns appear in both the post-compilation period and post-publication period of short interest. This suggests that publication of large short interest is a bearish signal to other investors. The authors also find evidence of a small stock effect in short sales. Interestingly, the authors found that during the period of their study (January 1987 – January 1991) firms listed on the NYSE and Amex earned larger abnormal returns for the short seller than on the NASDAQ. This is significant because during the period of the study, there was no uptick rule for NASDAQ securities. This seems to be opposite of traditional thinking, where an unregulated market promotes larger abnormal returns.

## Is High Short Interest Bullish?

Most long investors look at high short interest as being a bullish indicator. These investors see high short interest as latent demand because at some point short sellers must cover their positions by purchasing stock. Usually a short interest ratio that is greater

than 3.00 is seen to be bullish.[55] Although this is the common view among investors, the evidence supporting this viewpoint is rather scarce compared to the evidence that high short interest is bearish.

Immediately after the publication of Seneca's article in 1967 supporting short interest as a bearish signal, Hanna (1968) replied with some observations of his own. Hanna criticized some of the methods used in Seneca's research. He then suggested his own method for measuring the effect of short interest. Hanna recommended an adjustment to Seneca's analysis by restricting the abnormally large and small representations of short interest to those that are greater than 1 or 1.5 standard deviations away from the mean, thus isolating those issues where the informational effect of short selling is apparent. This adjustment was later used in several studies already mentioned including, Figlewski (1981), Senchak and Starks (1993), and Choie and Hwang (1994).

Hanna's contention that short interest is bullish lies in tracing the performance of portfolios based on assumptions about short interest. Hanna assumed that high short interest was bearish, as per Seneca's study and invested when short interest was low and exited the market when short interest was high. This portfolio resulted in six consecutive losses, whereas a portfolio that assumed high short interest was bullish resulted in over 1,000 per cent hypothetical gains. Therefore, Hanna concludes that the evidence shows high short interest is bullish.

## The Case for Neither Bearish Nor Bullish?

Kerrigan (1974) looked at 200 monthly short interest ratios from October 1952 to May 1969. Kerrigan found that there is a high correlation between the short interest over two, three and four months indicating that short interest ratios tend to move toward their average value. He also found evidence that indicated that high short interest ratios are bullish and low short interest ratios are bearish. However, upon further inspection he found that the short interest volume component of the short interest ratio is relatively uncorrelated with changes in the market. On the other hand, there is a high amount of correlation between the average daily volume component of the short interest ratio and market movements. Therefore, he concludes that the reason that high short interest ratios

[55] Walker: 128-129

are bullish has nothing to do with the change in short interest, but it has a lot to do with the change in average daily volume. The effectiveness of the short interest ratio is mainly due to the tendency for volume to be relatively high during bull markets and low during bear markets. High and falling short interest ratios represent increasing average daily volume as much as they represent decreasing short interest because average daily volume is in the denominator of the short interest ratio. High short interest ratios are a predictor of future bull markets only if they tend not to stay high for long.

Hurtado-Sanchez (1978) studied the nature and the extent of the relationship between a stock's short interest that stock's recent past and proximate future performance. He examined 425 industrials and selected every other stock within each industry grouping as control sample. He sampled all NYSE stocks with consistently high short interest as his test sample. His study covers a 21 month period between January 1966 and September 1967. He examined seven variants of short interest including short interest changes and measured excess returns via the capital asset pricing model (CAPM). His results found that short interest, regardless of the variants, does not affect current or future returns. He also found that after or during the period when stocks experience excess returns that are greater than those of other stocks, they are heavily shorted. He concluded that short sales help to bring a stock's returns in line with its risk and by creating imperfections in the short selling mechanism (through regulation) the regulators are creating discrepancies between expected and realized returns.

Brent, Morse and Stice (1990) found that there is no relationship between changes in short interest and returns in subsequent months. Only one year out of four measured years (1981 – 1984) showed a significant negative return when there was a decrease in short interest during the prior month. During the rest of the years mean return and change in short interest were uncorrelated.

Woolridge and Dickinson (1994) sought to find whether short sales affect security prices and to determine whether a high level of short interest is bullish or bearish. They measured 50 companies from the NASDAQ and 50 from the NYSE and Amex, combined, over a six-year period (1986 – 1991). They used linear regression to test the relationships between monthly returns and changes in short position. They found that the slope coefficient was slightly positive yet insignificant when they regressed the return on

a firm's stock as the dependant variable and short interest as the independent variable. The positive relationship would suggest that as short interest increases, so does the monthly return on the stocks, thus presenting a bullish relationship. However, their results were insignificant therefore it can be assumed that there is little association between short interest and stock returns.

Aksu and Gunay (1995) searched for a causal relationship between short interest and stock prices. They used data compiled between January 1971 and December 1987. They employed a state space method in order to detect a relationship between short interest, stock prices and average trading volume. They found that stock prices are not co-integrated with short interest and average trading volume. Their results indicate that short interest and stock prices are not related with any other variable in their model nor are they related with one another. They claim that the inconsistent findings by other researchers are a result of the models that the other researchers used. The Aksu and Gunay state space model does not impose *a priori* any restrictions on the intercorrelations of the data.

## Current State of Short Selling – Summary and Conclusions

The amount evidence that high short interest and high short interest ratios are bearish is greater than the evidence that high short interest and high short interest ratios are bullish. Seneca (1967, 1969) found that when short interest ratios are growing then the market is expected to decline. Figlewski (1981) found that low short interest stocks provide high excess returns, and high short interest stocks provide lower excess returns. Senchack and Starks (1993) conclude that a negative market reaction occurs around the announcement date for companies with a large unexpected increase in short interest. They also found that when options are available in a given stock, market restrictions on short selling encourage the use of options for speculation rather than short selling. Choie and Hwang (1994) found that issues with a large reported short position under perform the S&P 500 on average. A study by Albert, Smaby and Robison (1997) concluded that those issues with a large reported short position under perform the S&P 500 on average. They also find evidence of a small stock effect in short sales. Hanna (1968), the only study to conclude that short selling is bullish, found that investing in a portfolio of issues when their short interest was low and selling when short interest was high resulted in six

consecutive losses, investing in the portfolio when short interest was high and selling when it was low resulted in over 1,000 per cent hypothetical gains.

However, general consensus of modern research into short selling is that short selling is unrelated to market prices. Kerrigan (1974) found that the use of the short interest ratios to predict advances and declines in particular issues is effective only to the extent that average daily volume, a component of the short interest ratio, is effective. The short interest volume component has no correlation with performance. Hurtado-Sanchez (1978) examined seven variants of short interest and found that short interest, regardless of the variants, does not affect current or future returns. Brent, Morse and Stice (1990) found that there is no relationship between changes in short interest and returns in subsequent months. Woolridge and Dickinson (1994) found only an insignificant relationship between the return on a firm's stock and short interest. Aksu and Gunay (1995) found using a state space model that stock prices are not co-integrated with short interest and average trading volume.

This non-informationality of short selling is most likely a result of the increased regulatory vigilance that ended the era of the bear raid. The uptick rule is the primary method by which the act of short selling is separated from market prices. The uptick rule makes it impossible to short sell into falling prices. Thus it is impossible to drive a stock's price down through short selling alone. However, not only does the uptick rule end bear raids, it also introduces inefficiencies in the market. There is evidence from Hurtado-Sanchez (1978), Figlewski (1981), Senchack and Starks (1993) that the uptick rule prevents negative information from being processed as efficiently as positive information. This creates an upward bias in stock prices where the risk-return relationship is out of balance in some issues.

Today's technology allows for efficient tracking of individual transactions. With the amount of information about particular sales that are available, plenty of evidence exists today with which to prosecute market manipulators that use short and distort schemes or bear raids. With firm justice and fair punishments, the threat of prosecution may be enough to prevent traders from participating in these types of activities. Short sale regulation may be unnecessary.

The SEC should consider easing short selling restraints by phasing out the uptick rule. First, the SEC should suspend the uptick rule except for situations where a firm's price has fallen below a designated market price floor or percentage of the opening price limit. Later, after observing the effects that the new regulation has on the markets and after testing for problem areas with the regulation, the SEC should consider abolishing the uptick rule altogether and rely on the threat of prosecution to deter market manipulators. This is done in many different areas today, including naked short selling. A mechanism does not exist to prevent naked short selling; it is merely outlawed, so that anyone participating in the practice opens himself or herself to punishment.

The margin requirements for short selling are a quite normal form of monetary control. Relaxing margin requirements for short selling may improve the short selling function. Easing margin requirements would alleviate some of the financial cost of short selling and aid in correcting the inequity in the effects of negative information compared to positive information that the costs of short selling creates. The elimination of margin requirements in total is impractical, because short selling without margin requirements would technically allow free borrowing of unlimited amounts of money. The volatility caused by eliminating margin requirements would be unwelcome.

Short selling provides several benefits that are often overlooked in common analysis of the short selling function. First, short selling helps cushion market declines. Since all short sellers are potential buyers of stock, short selling can prop up the market during a general decline. As short sellers attempt to cover their positions, they go to the market to buy stock. Often in general market downturns, short sellers are the only buyers. Second, short selling provides for liquidity in the markets that aids in the efficient processing of market information. Thirdly, short sellers are too often the first to identify companies committing their own form of market manipulation through accounting fraud and other types of deceit.

Short selling is a legitimate market function, and the practice of short selling provides observable and documented benefits to the market. Negative public opinion toward short selling is a result of a lack of education about its benefits. Freer short selling regulation can ensure that risk-return relationships are in balance and that

purchasers of a stock are getting the appropriate return – a return that is matches their expectations.

There have been too many manipulative and fraudulent short selling schemes in the past to say that caution toward short selling is not warranted. Short selling has earned the bright orange jumpsuit of a convict through high profile bear raids in the past and the passing of misleading information to the public by short and distorters. However, short selling's past is not its present or its future. The tools exist to create a smooth running and well monitored environment in which an investor of any bent should be able to go about investing his money as he sees fit. The day of stringent short selling regulation is past; let the markets be free.

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# The Effect of the Public Release of Short Interest Information on the Market Prices of NASDAQ Technology Stocks

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## Purpose of the Study

This study examines whether or not the release of short interest information triggers reaction in the prices of technology stocks. This reaction is measured in the sample in three tests to measure the effect of the release of short interest information according to short interest volume, short interest ratios and market value. These tests answer the question: is the level of short interest volume a predictor of future returns in technology stocks?

## Sampling and Data

Our sample consists of stocks from the Dow Jones Technology Index (DJTI) that are listed on the NASDAQ. The DJTI consists of the following sectors: Computers, Diversified Technological Services, Internet, Software, Semiconductors, Office Equipment and Telecommunications. To be included in the sample a given stock must have had monthly short interest volume information available from January 1995 through September 2002. There are approximately 650 companies in the Dow Jones Technology index. One hundred and sixty one of those stocks are NASDAQ issues that have complete short volume information for the period tested. Approximately 145 of those stocks had complete CRSP data in a given month during the period tested. Short interest data was gathered from http://www.viwes.com/invest/shorts/. All other data including daily price information was obtained from the CRSP file at the School of Business at Ball State University. Observations were taken daily from eighty-four monthly periods: January 1995 to December 2001. There are 12,600 total observations in the study (84 months X approximately 145 companies (observations)/month).

## Methodology

Daily returns from the CRSP file on each stock were compared to the expected returns generated using the capital asset pricing model (CAPM):

$$R_{expected} = R_{risk\ free} + (R_{market} - R_{risk\ free}) * \beta_{Beta\ coefficient}$$

That is the expected return for given issue is the risk free rate (represented by the return on 90 day U.S. treasury bonds) plus the beta coefficient (risk of the firm compared to the market computed monthly from historical data) times the quantity market rate (represented by the value-weighted rate of return of the NASDAQ, NYSE and AMEX

markets as a whole) minus the risk free rate. The risk free rate, market rate and beta were all obtained from the CRSP data file. The expected return was then compared to the actual return for the stock. Actual return was computed with the formula:

$$R_{actual} = (Price_{t+1} - Price_t) / Price_t.$$

Variation between the expected return and the actual return represents abnormal residual. The formula used to compute abnormal residuals is as follows:

$$A_{abnormal\ residual} = R_{actual} - R_{expected} + e_{error\ term}$$

Negative abnormal residuals are important for the purposes of a short selling study. Negative abnormal residuals represent an unexpected positive return for the short seller.

The abnormal residuals are accumulated daily, throughout a thirty-one day period where time zero is the twelfth day of a given month. The twelfth day was chosen because that is the day when the NASDAQ makes the prior month's short interest information available. The observations are grouped according to their relationship to the informed investors date: from fifteen days prior (-15) to the informed investors date (day 0), on day 0, and to fifteen days after day 0 (+15). The abnormal residuals are summed across days (all day –14's are summed, all day –13's are summed and so on) and the stocks are summed together according to our criteria to arrive at the sum of the abnormal residuals (SUM) for a given group on a given day in our event study. When this information for a given day is divided by the number of periods (84) and the number of issues in the group it provides us with the abnormal returns (ARs) for a given group on a given day in the event study.

In order to determine what time frames may be affected by the availability of short selling information, the ARs are accumulated over various time periods. These are referred to as cumulative average abnormal returns (CARs). One tailed T-statistics are used throughout the study to determine the significance of the ARs and the CARs

First, the ARs for the entire sample of 31-day event study are examined in order to determine whether or not the availability of short selling information causes technology stocks to generate negative ARs. If short selling information does indeed

cause technology stocks to generate negative ARs, one would expect to see significant negative ARs after the short interest information was released.

Second, the CARs are examined to determine whether persistent negative returns accumulate over several different periods of time. This study examines the following intervals:

0 to +1
0 to +5
0 to +7
0 to +9
0 to +10
0 to +11

Third, the ARs and CARs are separated into deciles (ten groups) according to their short interest volume. These deciles are based on the previous months short interest data. If greater short interest volume causes significantly greater ARs and CARs over the informed investors period one could conclude that greater short interest volume causes larger negative ARs. Thus the level of short interest volume would be a predictor of future returns. This information could be used to create a profitable trading strategy.

Fourth, the ARs and CARs are separated into deciles according to their short interest ratios. Once again, these deciles are based on the previous months short interest data. The short interest ratio allows the short interest volume to be controlled for the market volume of a given stock. Generally, stock with a larger market volume will have larger short interest volume as well, *ceterus paribus*. If larger short interest ratio deciles are found to generate significantly greater ARs and CARs over the informed investors period one could conclude that greater short interest ratios are a predictor of future returns, as well. This could also be used to create a profitable trading strategy.

Fifth, the ARs and CARs are separated into deciles according to their daily trading volume. Daily trading volume is a proxy for market value of the firm underlying the stock. Here, the study examines market value more closely to determine whether high daily trading volume indicates greater future negative abnormal returns, as well. Generally, stocks with larger market value have more information available to the public and are more easily traded.

## Results

Significant negative ARs appear over the sample in several places. The days –14 through –8 all show significant ARs: negative on days –14 through –12, -10 and –9; positive on days –11 and -8. Although not relevant to the purpose of this study, these results are nonetheless interesting because of their consistency. Abnormal returns also appear close to the informed investors date. Day –1 shows the largest significant positive AR for the event study. Day +1 shows the largest negative AR for the event study. Both are significant at the 1% level. The implication of these results are that it appears that there is a build up in stock price on the day prior to the release of short interest information by NASDAQ, and then a release on day 1 of the informed investors period. Significant ARs continue to appear throughout the remainder of the month. On day +6, the second largest negative ARs appear for the event study. Then on days +8 and +13 there are increasingly positive ARs. Days +9 and +15 show decreasingly negative ARs. All the above-cited ARs are significant at the 1% level.

Table 1: NYSE Technology Abnormal Residuals (ARs) and Cumulative Abnormal Residuals (CARs)

| Day | ARs | Probability (t-Test) | Significance | CARs from t= -15 |
|---|---|---|---|---|
| -15 | -0.000044 | 0.9139 | | (0.000044) |
| -14 | -0.002069 | 0.0001 | *** | (0.002113) |
| -13 | -0.000913 | 0.0340 | ** | (0.003026) |
| -12 | -0.002295 | 0.0001 | *** | (0.005321) |
| -11 | 0.001023 | 0.0138 | ** | (0.004298) |
| -10 | -0.000933 | 0.0283 | ** | (0.005231) |
| -9 | -0.001182 | 0.0064 | *** | (0.006413) |
| -8 | 0.001049 | 0.0150 | ** | (0.005364) |
| -7 | 0.000215 | 0.6301 | | (0.005148) |
| -6 | -0.000016 | 0.9698 | | (0.005164) |
| -5 | 0.000750 | 0.0802 | * | (0.004414) |
| -4 | 0.000955 | 0.0176 | ** | (0.003459) |
| -3 | 0.000183 | 0.6646 | | (0.003276) |
| -2 | 0.000752 | 0.0732 | * | (0.002524) |
| -1 | 0.002503 | 0.0001 | *** | (0.000021) |
| 0 | -0.000323 | 0.4315 | | (0.000343) |
| 1 | -0.002645 | 0.0001 | *** | (0.002988) |
| 2 | 0.000789 | 0.0869 | * | (0.002199) |
| 3 | 0.000531 | 0.2177 | | (0.001668) |
| 4 | -0.000810 | 0.0598 | * | (0.002477) |
| 5 | -0.000277 | 0.5114 | | (0.002754) |
| 6 | -0.002240 | 0.0001 | *** | (0.004994) |
| 7 | -0.000841 | 0.0459 | ** | (0.005835) |
| 8 | 0.001206 | 0.0053 | *** | (0.004629) |
| 9 | -0.001633 | 0.0001 | *** | (0.006262) |
| 10 | -0.000924 | 0.0241 | ** | (0.007186) |
| 11 | -0.000161 | 0.7155 | | (0.007347) |
| 12 | 0.000479 | 0.2632 | | (0.006868) |
| 13 | 0.001819 | 0.0001 | *** | (0.005049) |
| 14 | 0.000307 | 0.4879 | | (0.004743) |
| 15 | -0.001443 | 0.0009 | *** | (0.006186) |

*Significant at 10% level
**Significant at 5% level
***Significant at 1% level

**Chart 1: CARs and ARs Surrounding The Event Date**

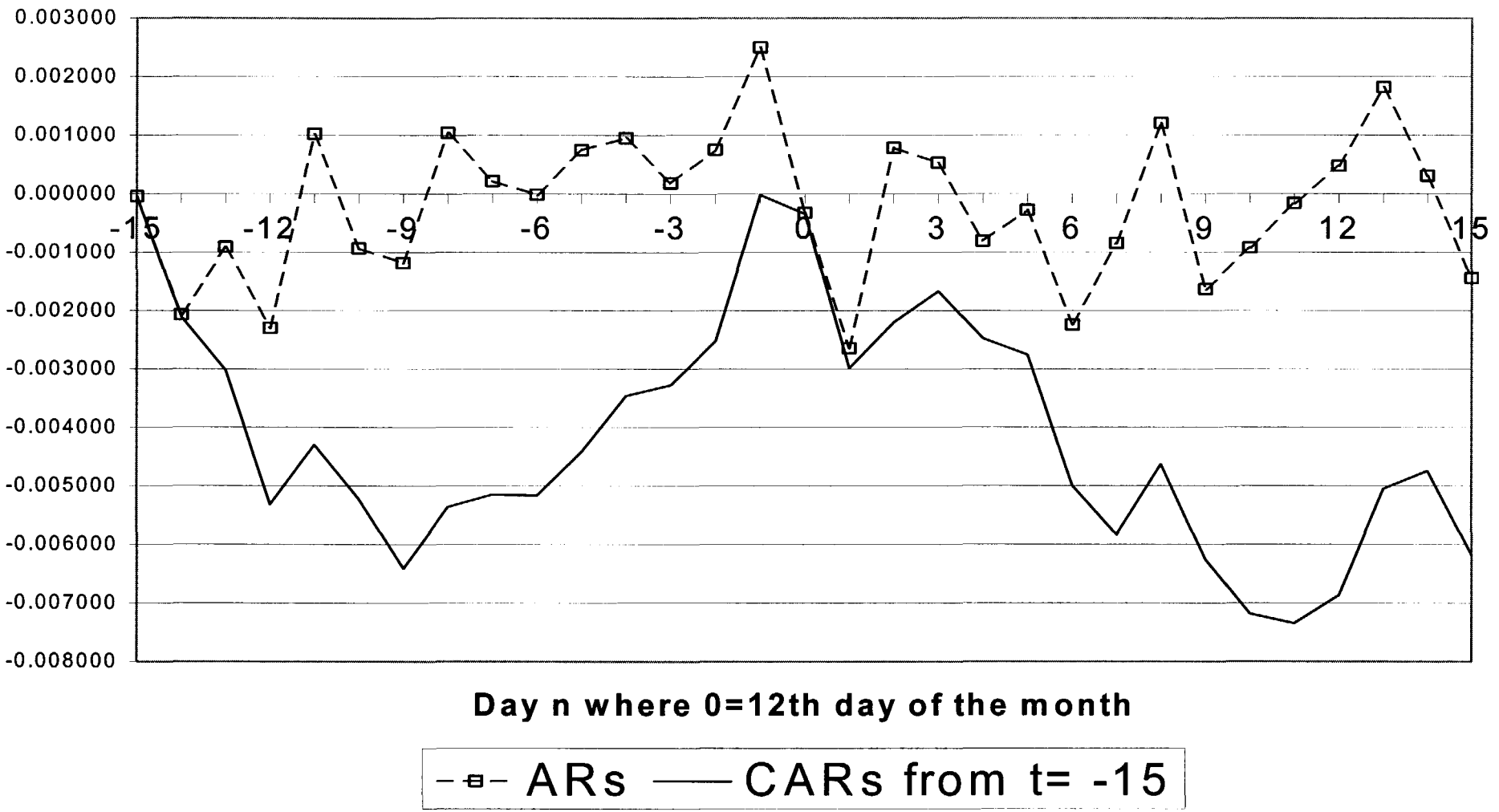
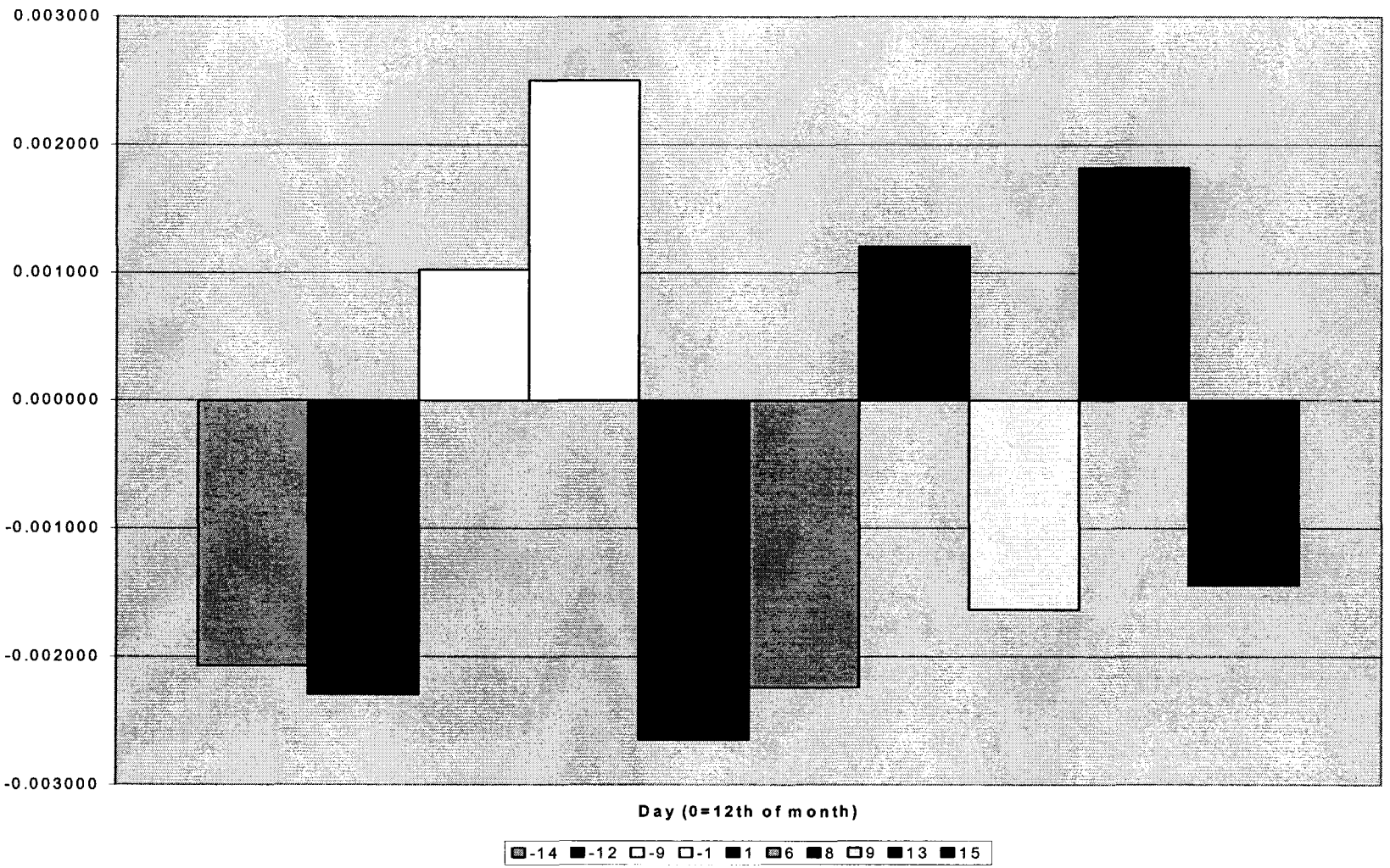


**Chart 2: Size of Significant Abnormal Residuals**



We see a pattern as illustrated in charts 1 and 2 of a build up of positive ARs prior to the event date, then a release of those ARs in the form of negative ARs in the informed investors period.

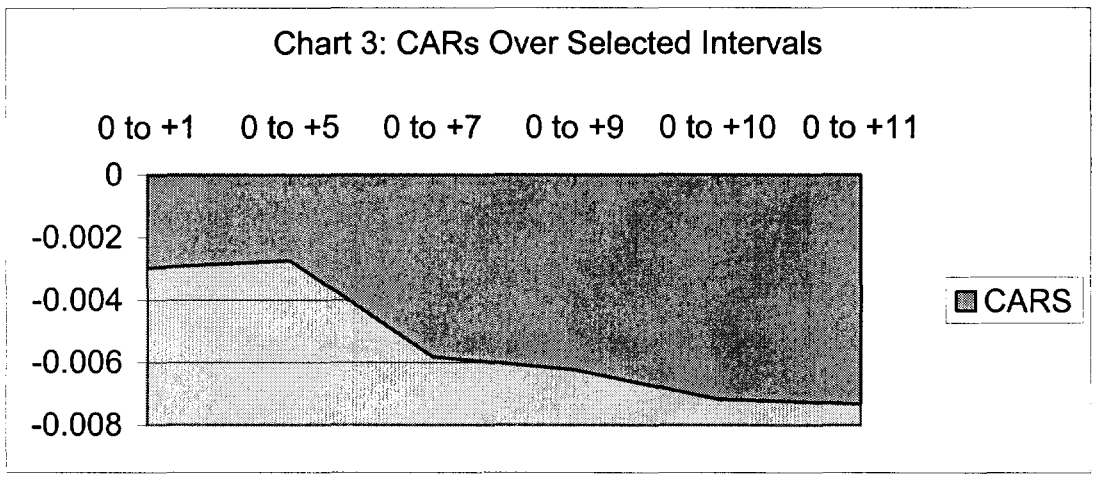
Next, we examined the CARs over several intervals during the informed investors periods. Each of the CARs examined were negative with significance at the 1% level.

**Table 2: CARs Over Selected Intervals**

| Interval | CARs | Probability (t-Test) | Significance |
|---|---|---|---|
| 0 to +1 | -0.0029675 | 0.0001 | *** |
| 0 to +5 | -0.0027335 | 0.0042 | *** |
| 0 to +7 | -0.0058144 | 0.0001 | *** |
| 0 to +9 | -0.0062413 | 0.0001 | *** |
| 0 to +10 | -0.0071657 | 0.0001 | *** |
| 0 to +11 | -0.0073266 | 0.0001 | *** |

*Significant at 10% level
**Significant at 5% level
***Significant at 1% level

This illustrates that persistent negative ARs are generated after the release of short interest information on day 0. The release of short interest information causes an unexpected negative reaction in NASDAQ technology stocks with reported short interest in a given month.



Next this study examines these CARs and selected ARs with the stocks grouped according to short interest volume deciles. The issues with the largest reported short interest volume for the prior month are grouped in decile 10, those issues with the smallest reported short interest volume for the prior month are grouped into decile 1. The rest of the issues are stratified accordingly into deciles 9 through 2. There appears to be a strong correlation between large short interest volume and negative ARs. Decile 10 has significant negative ARs at the 5% level on each of the dates examined 0, +1, and +9. On day +1, deciles 9 through 6 have significant negative ARs at the 1% level. On day +9, deciles 8, 7 and 6 have negative ARs at the 1%, 5% and 10% levels, respectively.

The CARs paint a more interesting picture. For days 0 through +1 the largest five deciles have significant negative CARs. All but decile 7 are significant at the 1% level. For days 0 through +7, deciles 7 through 5 have significant negative CARs at the 1% level. For days 0 through +11, deciles 9, 7, and 5, have significant negative CARs at the 1% level. Decile 8 has significant negative CARs at the 5% level as well. These results indicate that stocks with larger short interest volume generate significant negative CARs. These results favor the notion that high short interest triggers a negative response in stock prices.

Table 3: Selected Average Abnormal Residuals and Cumulated Abnormal Residuals by **Short Interest Decile**
1 = Lowest Short Interest Volume, 10 = Largest Short Interest Volume

| | DAY 0 | | | DAY +1 | | | DAY +9 | | |
|---|---|---|---|---|---|---|---|---|---|
| Decile Group | ARs | Probability (t-Test) | Significance | ARs | Probability (t-Test) | Significance | ARs | Probability (t-Test) | Significance |
| 10 | -0.001961 | 0.0391 | ** | -0.002308 | 0.0117 | ** | -0.002404 | 0.0146 | ** |
| 9 | -0.000079 | 0.9457 | | -0.003150 | 0.0050 | *** | -0.005151 | 0.0001 | *** |
| 8 | 0.000058 | 0.9639 | | -0.004807 | 0.0001 | *** | -0.002972 | 0.0171 | ** |
| 7 | 0.000710 | 0.5833 | | -0.004334 | 0.0006 | *** | -0.002421 | 0.0543 | * |
| 6 | -0.001797 | 0.2012 | | -0.003278 | 0.0097 | *** | 0.000544 | 0.6838 | |
| 5 | -0.000271 | 0.8420 | | -0.003309 | 0.0144 | ** | -0.001594 | 0.2414 | |
| 4 | 0.000505 | 0.7044 | | -0.000990 | 0.4401 | | -0.000051 | 0.9724 | |
| 3 | -0.001060 | 0.4145 | | -0.000767 | 0.5642 | | -0.001030 | 0.4620 | |
| 2 | 0.001546 | 0.2659 | | -0.003581 | 0.0057 | *** | 0.002917 | 0.1050 | |
| 1 | -0.000546 | 0.7292 | | 0.000094 | 0.9514 | | -0.002382 | 0.1385 | |

| | DAYS (0, +1) | | | DAYS (0, +7) | | | DAYS (0, +11) | | |
|---|---|---|---|---|---|---|---|---|---|
| Decile Group | CARs | Probability (t-Test) | Significance | CARs | Probability (t-Test) | Significance | CARs | Probability (t-Test) | Significance |
| 10 | -0.004269 | 0.0010 | *** | -0.003303 | 0.2143 | | -0.005335 | 0.0957 | * |
| 9 | -0.003229 | 0.0001 | *** | -0.003321 | 0.2641 | | -0.009930 | 0.0057 | *** |
| 8 | -0.004750 | 0.0059 | *** | -0.005316 | 0.1301 | | -0.008778 | 0.0353 | ** |
| 7 | -0.003624 | 0.0461 | ** | -0.014368 | 0.0001 | *** | -0.017904 | 0.0001 | *** |
| 6 | -0.005075 | 0.0099 | *** | -0.010607 | 0.0054 | *** | -0.006654 | 0.1579 | |
| 5 | -0.003580 | 0.0579 | * | -0.011643 | 0.0028 | *** | -0.015661 | 0.0009 | *** |
| 4 | -0.004851 | 0.7940 | | -0.001084 | 0.7644 | | 0.000248 | 0.9540 | |
| 3 | -0.001827 | 0.3170 | | -0.001829 | 0.5922 | | -0.006159 | 0.1366 | |
| 2 | -0.002035 | 0.2417 | | -0.005676 | 0.1189 | | -0.000851 | 0.8515 | |
| 1 | -0.000453 | 0.8223 | | 0.001585 | 0.6905 | | 0.002367 | 0.6219 | |

| | DAYS (+2, +7)[A] | DAYS (+7, +11)[A] |
|---|---|---|
| Decile Group | CARs | CARs |
| 10 | 0.000966 | -0.002033 |
| 9 | -0.000093 | -0.006609 |
| 8 | -0.000566 | -0.003462 |
| 7 | -0.010745 | -0.003536 |
| 6 | -0.005532 | 0.003954 |
| 5 | -0.008062 | -0.004018 |

[A] Extrapolated from data above

Next this study examines these CARs and selected ARs with the stocks grouped according to short interest ratio deciles. This is important because short interest ratios control for size by dividing total shares shorted (total short interest) by the average daily volume for a given stock. Applying the same decile grouping procedures described in the last test, the results turned out rather unimpressive. The short interest ratio deciles 3 and 5 had scattered significant ARs and CARs. However, no particular pattern emerged.

When the residuals were separated into market value deciles, much the same pattern appeared as in the short interest volume decile test. On day 0, only deciles 9 and 10 have significant negative ARs. On day +1, a greater number of deciles (10 through 5) have significant negative ARs. On day +9, deciles 10 through 6 have significant negative ARs.

The CARs grouped according to market value tell a similar tale. For days 0 through +1, deciles 10 through 8 have significant negative CARs at the 1% level. For days 0 through +7, deciles 10 through 5 have significant negative CARs. Deciles 9 through 7 are significant at the 1% level; deciles 10, 6 and 5 are significant at the 5% level. Decile 1 has a significant positive CAR at the 5% level.

Table 4: Selected Abnormal Residuals and Cumulated Abnormal Residuals by **Market Value Decile**
1 = Lowest Market Value, 10 = Largest Market Value

| | DAY 0 | | | DAY +1 | | | DAY +9 | | |
|---|---|---|---|---|---|---|---|---|---|
| Decile Group | AR | Probability (t-Test) | Significance | AR | Probability (t-Test) | Significance | AR | Probability (t-Test) | Significance |
| 10 | -0.002331 | 0.0139 | ** | -0.003083 | 0.0010 | *** | -0.004439 | 0.0001 | *** |
| 9 | -0.002201 | 0.0679 | * | -0.005483 | 0.0001 | *** | -0.003117 | 0.0050 | *** |
| 8 | -0.000899 | 0.4205 | | -0.004768 | 0.0010 | *** | -0.004151 | 0.0001 | *** |
| 7 | 0.001858 | 0.1260 | | -0.003189 | 0.0127 | ** | -0.003553 | 0.0070 | *** |
| 6 | 0.001809 | 0.1437 | | -0.003396 | 0.0047 | *** | -0.003022 | 0.0127 | ** |
| 5 | 0.000464 | 0.7142 | | -0.002910 | 0.0121 | ** | -0.000539 | 0.6566 | |
| 4 | 0.000699 | 0.6178 | | -0.001608 | 0.2020 | | -0.000165 | 0.8904 | |
| 3 | -0.001037 | 0.4530 | | 0.000229 | 0.8648 | | 0.001840 | 0.1874 | |
| 2 | 0.000502 | 0.7424 | | -0.000924 | 0.5182 | | 0.000835 | 0.6214 | |
| 1 | -0.002260 | 0.2086 | | -0.001055 | 0.5554 | | 0.000268 | 0.8929 | |

| | DAYS (0, +1) | | | DAYS (0, +7) | | | DAYS (0, +11) | | |
|---|---|---|---|---|---|---|---|---|---|
| Decile Group | CARs | Probability (t-Test) | Significance | CARs | Probability (t-Test) | Significance | CARs | Probability (t-Test) | Significance |
| 10 | -0.005414 | 0.0001 | *** | -0.005929 | 0.0190 | ** | -0.011630 | 0.0001 | *** |
| 9 | -0.007684 | 0.0001 | *** | -0.008938 | 0.0036 | *** | -0.013676 | 0.0002 | *** |
| 8 | -0.005667 | 0.0004 | *** | -0.008608 | 0.0078 | *** | -0.013469 | 0.0005 | *** |
| 7 | -0.001332 | 0.4402 | | -0.009825 | 0.0053 | *** | -0.013345 | 0.0014 | *** |
| 6 | -0.001586 | 0.3507 | | -0.007230 | 0.0343 | ** | -0.009957 | 0.0186 | ** |
| 5 | -0.002445 | 0.1585 | | -0.007828 | 0.0271 | ** | -0.011508 | 0.0079 | *** |
| 4 | -0.000909 | 0.6328 | | -0.005774 | 0.1135 | | -0.005093 | 0.2402 | |
| 3 | -0.000808 | 0.6694 | | -0.002349 | 0.5166 | | -0.000762 | 0.8617 | |
| 2 | -0.000422 | 0.8350 | | -0.000345 | 0.9336 | | -0.001791 | 0.7255 | |
| 1 | -0.003315 | 0.1483 | | 0.001625 | 0.7239 | | 0.012468 | 0.0287 | ** |

| Decile Group | DAYS (+2, +7)[A] CARs | DAYS (+7, +11)[A] CARs |
|---|---|---|
| 10 | -0.000515 | -0.005701 |
| 9 | -0.001255 | -0.004738 |
| 8 | -0.002941 | -0.004861 |
| 7 | -0.008493 | -0.003520 |
| 6 | -0.005644 | -0.002726 |
| 5 | -0.005383 | -0.003680 |

[A] Extrapolated from data above

## Conclusions

Three conclusions can be drawn from this study. First, given the results of the ARs of the technology index surrounding the informed investors date, on the day prior to the release of short interest information, NASDAQ technology stocks generate unexpected positive returns. On the date of the release of the short interest information, or the informed investors date, and the following day unexpected negative abnormal returns are generated.

Second, short interest volume appeared to predict future abnormal returns. However, when short interest volume was controlled for market size, by grouping according to the short interest ratio, most significant ARs disappeared. A pattern of ARs does appear among the market value deciles, which follows closely to the pattern seen in the short interest volume groupings. This leads to the conclusion that the pattern in the short interest volume groupings appeared due to the fact that stocks with larger daily trading volume tend to have larger short interest volume for any given time period.

Third, some conclusions can be drawn about the pattern that appears in the market value study. The negative CARs are larger in the short run for the larger stocks. However, in the long run the negative CARs for larger firms aren't as large or significant as those of the mid-to-large stocks. It appears that the market processes negative information about stocks with the largest market value (deciles 9 and 10) over the short-term, in the day following an announcement of short interest. However, it appears that negative information takes longer to process for stocks of mid-to-large market value.